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Why do you play *World of Warcraft*? An in-depth exploration of self-reported motivations to play online and in-game behaviours in the virtual world of Azeroth

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ABSTRACT

Massively multiplayer online role-playing games (MMORPGs) are video games in which players create an avatar that evolves and interacts with other avatars in a persistent virtual world. Motivations to play MMORPGs are heterogeneous (e.g. achievement, socialisation, immersion in virtual worlds). This study investigates in detail the relationships between self-reported motives and actual in-game behaviours. We recruited a sample of 690 *World of Warcraft* players (the most popular MMORPG) who agreed to have their avatar monitored for 8 months. Participants completed an initial online survey about their motives to play. Their actual in-game behaviours were measured through the game's official database (the *Armory* website). Results showed specific associations between motives and in-game behaviours. Moreover, longitudinal analyses revealed that teamwork- and competition-oriented motives are the most accurate predictors of fast progression in the game. In addition, although specific associations exist between problematic use and certain motives (e.g. advancement, escapism), longitudinal analyses showed that high involvement in the game is not necessarily associated with a negative impact upon daily living.

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1. Introduction

Video game play has become a major leisure activity during the past 30 years. For a long time, it was mainly considered to be a teenage male activity. Recent studies broke this stereotype by showing that the number of adults and females playing video games has grown exponentially in recent years (Griffiths, Davies, & Chappell, 2003, 2004). This is particularly true for one of the most recent and popular types of video games called massively multiplayer online role-playing games (MMORPGs). MMORPGs are computer role-playing games in which thousands of players interact with one another in a persistent virtual world—an environment that exists independently of the players. Thus, in an MMORPG, the world continues to exist when the user is not logged in, and events and interactions between other players occur while the user is absent from the persistent virtual environment. The most popular MMORPG is *World of Warcraft* (WoW), a game that takes place in a heroic fantasy-based world called “Azeroth,”

resembling J.R.R. Tolkien's Middle Earth described in the saga *The Lord of the Rings* (Tolkien, 1954). When playing WoW, players assume the role of a fictional character evolving in the world of Azeroth. Character creation involves various components such as the selection of an avatar (a visual representation of the character in the virtual world), gender, race (e.g. human, elf, dwarf, orc), class (e.g. warrior, mage, rogue, priest) and faction (“good” characters are regrouped in the Alliance, and “bad” characters are regrouped in the Horde). The concept of progression is a central feature of WoW, implying that a player's character will acquire new skills and powers as rewards for succeeding in missions or quests (e.g. defeating a powerful monster, finding a specific item). Another fundamental aspect of WoW is its social interactions. Indeed, when playing, it is possible to communicate easily with other players (written chat or audio). In addition, players also regroup themselves in *guilds* (persistent hierarchical organisations of characters with common objectives and backgrounds). Each guild has its own rules. Players who want to be enrolled generally need to contact the *guild's master* and present their motivations and proofs that their characters meet the guild's requirement (Taylor, 2006). An estimation of the total number of MMORPG players worldwide is 20 million (10 million accounting only for WoW) (MMOdata.net, 2012). These numbers suggest the importance of studying the

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motivations to play specific popular games such as MMORPG in order to better characterise the reasons that video game play is so successful and to eventually prevent both problematic usage and arbitrary stigmatisation by the media (e.g. with regard to addiction or violence).

Research on online games has highlighted that an individual's motivations for playing MMORPGs have a crucial role in the onset of online game involvement and in its continuation (Yee, 2006a, 2006b). Initial work on people's motivation to play online was conducted by Richard Bartle (1996) on the basis of qualitative interviews. Bartle formulated a taxonomy with four different types of players: Achievers (players who give themselves game-related goals and persevere until they achieve them), Explorers (players who try to find out as much as they can about the game's virtual world), Socializers (players who use the game's communication facilities to interact with other players), and Killers (players who use the tools provided by the game to cause distress or to beat other players). Ten years later, Nick Yee conducted the first empirical studies aimed at identifying the various motivations of online game players (2006a, 2006b). Yee (2006b) in particular conducted an online survey of 3000 MMORPG players. Three broad types of motivations were identified: those related to achievement, to social activity, and to immersion in a virtual world. Each was subdivided into specific subcomponents (e.g. the social factor comprises distinct types of motives such as playing to create new relationships or seeking to solve problems through teamwork). To date, motivations for playing have been related to self-reported use (e.g. hours played per week, preferences regarding certain aspects of the game) (Yee, 2006a, 2006b; Zanetta Dauriat et al., 2011), as well as to problematic or "addictive" use of MMORPGs (e.g. loss of control of time spent playing, negative outcomes resulting from excessive play; see Kuss & Griffiths, 2011, for a review regarding psychological predictors of problematic online game use).

Yee's work (2006a, 2006b) provided a first significant step toward the building of an empirically based framework for studying motivations to play online games. Nevertheless, a second necessary step to strengthen the validity of the postulated motivations for playing online is to test whether these motivations effectively predict the way people behave in virtual worlds (i.e. the actions players realise such as exploring, role playing, competing with other players, involvement in guilds, and type of progression favoured).

The current study is a first attempt to extensively investigate the relationships between players' self-reported motives and their actual in-game behaviours. The study sample consists of WoW players who agreed to have their avatar monitored for 8 months. Participants completed an initial online survey that focused on self-reported motives to play, as well as usage patterns (e.g. number of hours played per week). Actual in-game behaviours were then collected through the French *Armory* website, an official comprehensive database reporting the achievements of the characters evolving in WoW. Our main objectives were to (1) explore specific associations between players' reported motives and actual in-game actions, and (2) determine through a longitudinal design the predictive value of reported motives in players' involvement and progression in WoW.

2. Method

2.1. Procedure

Inclusion criteria were French-speaking WoW players aged 18 years or older. Participants were mainly recruited through advertisements posted in specialised French language European forums: the official Blizzard WoW forum, the guild's forum (almost all guilds in WoW have their own forums), and more general for-

ums about video games and MMORPGs. A part of the sample also learned about the study through articles in the local press or on television. After potential participants connected on the study's website (e.g. after having seen an advertisement in a forum), they had access to information about the study through a disclaimer. Participants were also invited to mention the name of their character and the name of the server in which they play. All participants gave online consent prior to starting the online survey. Anonymity of the participants was guaranteed (no data on the gamers' identities were collected, including their Internet Protocol [IP] address). The study questionnaire went online in June 2010. Every completed survey was followed by avatar data collection (the elapsed time between questionnaire completion and *Armory* data collection was no more than 7 days). Inclusion in the study ended on December 7, 2010, when the game expansion *Cataclysm* was implemented in WoW. Longitudinal data collection was operationalised through a second measure of avatars' statistics on the *Armory* website within a 1-week period (February 14–20, 2011). The study protocol was approved by the ethical committee of the Psychology Department of the University of Geneva. Some questionnaires included in the initial survey did not relate to the current study and will be presented elsewhere.

2.2. Participants

In total, 1601 participants started the survey. Among them, 1059 participants (66.15% of the sample) aged 18 or older completed the entire survey at the time of testing. The final sample consisted of 690 participants (65.16% of the 1059 completers) who agreed to provide the names of their avatar and the realms in which they play (i.e. the name of their server, which is necessary to identify the avatar). The majority of participants were male (87.10%). This gender ratio is comparable with other online gaming studies (e.g. Achab et al., 2011; Peters & Malesky, 2008). The age of the participants ranged from 18 to 66 years ($M = 26.22$, $SD = 8.14$). The participants reported living in France (73.6%), Switzerland (18.8%), Belgium (4.8%) or other countries (2.1%). The remaining participants (.7%) did not report their nationalities. At the time of the survey, the participants were employed (54.9%), were undergraduate students (37.5%), were unemployed (5.5%) or did not indicate their profession (2.1%). Among the employed participants, the highest proportion was in IT-related professions (23.8%). Almost all participants reported playing WoW at home (99.7%), but some also played in cybercafés (5.5%) and/or at work (2.5%). The majority of the participants reported playing WoW for more than 4 years (43.5%). The mean hours devoted weekly to WoW is equal to 25.17 h ($SD = 15.61$, range 2–112), which corresponds to the findings of previous studies (e.g. Billieux et al., 2011; Peters & Malesky, 2008).

2.3. Measures

2.3.1. Motivation to Play in Online Games Questionnaire (MPOGQ)

The MPOGQ was developed by Yee (2006b) to measure players' motives to engage in online games. We adapted the original instructions of the MPOGQ so that the items refer to the motivations for playing WoW (and not online games in general). The French version of the MPOGQ was developed within the framework of a preliminary study (Billieux et al., 2011). It comprises 39 items scored on a 5-point Likert scale. The factorial structure of the scale was verified through confirmatory factor analysis (see [Supplementary online material](#)). The various subscales measured by the MPOGQ are as follows: Advancement (desire to gain power, progress rapidly and accumulate in-game symbols of wealth or status, Cronbach's $\alpha = .80$), Mechanics (interest in analysing the underlying rules and system in order to optimise character performance, Cronbach's $\alpha = .75$), Competition (desire to challenge

and compete with others, Cronbach's $\alpha = .76$), Socialising (interest in helping and chatting with other players, Cronbach's $\alpha = .76$), Relationship (desire to form long-term meaningful relationships with others, Cronbach's $\alpha = .73$), Teamwork (deriving satisfaction from being part of a group effort, Cronbach's $\alpha = .74$), Discovery (desire to find out and know the game's elements or places that most players do not know about, Cronbach's $\alpha = .85$), Role-play (tendency to create a character with a background story and the desire to interact with other players according to their story, Cronbach's $\alpha = .67$), Customisation (interest in customising the appearance of their avatar, Cronbach's $\alpha = .73$), and Escapism (tendency to use the online environment to avoid thinking about real-life problems, Cronbach's $\alpha = .65$). A mean score was computed for each subscale and used in further analyses.

2.3.2. Internet Addiction Test (IAT)

The IAT was incorporated as a control variable for our analyses. Indeed, we wanted to investigate the relationships between self-reported motives and actual in-game behaviour engagement while controlling for potential "addiction" or dysfunctional usage patterns. To this end, the original instruction of the French IAT (Kha-zaal et al., 2008) was adapted so that the items refer only to time spent playing WoW (and not to time spent on the Internet in general as in the original version of the scale). The adapted IAT is a 20-item questionnaire assessing negative consequences resulting from WoW use. All items are scored on a 5-point Likert scale. The internal consistency of the whole scale is high in the current sample (Cronbach's $\alpha = .89$).

2.3.3. Type of server chosen

WoW is duplicated (mirrored) across different servers (i.e. realms) to prevent the servers from becoming too crowded and allowing communities to be based on language, time zones and different play styles for different users. Four different types of server exist: (1) Player versus Environment (PvE, mainly focused on quests and raids against non-player characters); (2) Player versus Player (mainly focused on players' direct confrontations); (3) Role-play (RP, which are PvE servers with an accent on acting of characters as in a traditional role-playing game); (4) Roleplay – Player versus Player (RP – PvP, which are PvP servers with an accent on role play as in RP servers).

2.3.4. Guild affiliation

Guilds are in-game associations of player characters. They are formed to make collective actions (e.g. "raids") easier and more rewarding, as well as to form a social atmosphere (e.g. through social exchanges in the guild's forum). The fact that a player is or is not affiliated with a guild is key information regarding the way he/she plays.

2.3.5. In-game behaviours

All information regarding in-game behaviours was collected by the investigators on the *Armory* website of the French community of WoW: <http://eu.battle.net/wow/fr/>. In specifying the name and server of a character, it is possible to access a wide range of information about a specific character (including actual in-game attitude reflected by the types of achievements reached, guild membership, items owned, or detailed skills and ratings). We decided to focus on the type of achievements favoured by the players. These data can be considered as the best ecological measure of both the engagement of the players and their playing preferences. In the *Armory*, there were eight achievement categories (general, quests, exploration, player versus player, dungeon and raid, profession, reputation and world events). See Fig. 1 for an example of a screenshot of an avatar on the *Armory* website. The score of these eight achievements represents the total progression of the avatar in WoW. In addition to this total progression score, we also focused on five achievements listed earlier: (1) *Quest achievements*, which reflect progression in the various available quests in the game; (2) *Exploration achievements*, which can be obtained by exploring each area in the game; (3) *Player versus Player achievements*, which are earned by fighting other players in an arena or on battlegrounds; (4) *Dungeons and Raids achievements*, which are obtained through raids or dungeon crawling (i.e. specific missions needing a group of players as a team to reach a common objective and receive a reward); and (5) *Miscellaneous achievements*, which regroup a variety of non-necessary related actions (e.g. obtaining a certain number of tabards and vanity pets, falling from a great height).

For the purpose of the longitudinal analyses, three indexes of progression were computed: (1) a global index that depended on the total number of achievements accomplished without distinguishing between their types, (2) a PvP index that depended solely on the progression of PvP achievements and (3) a PvE index that

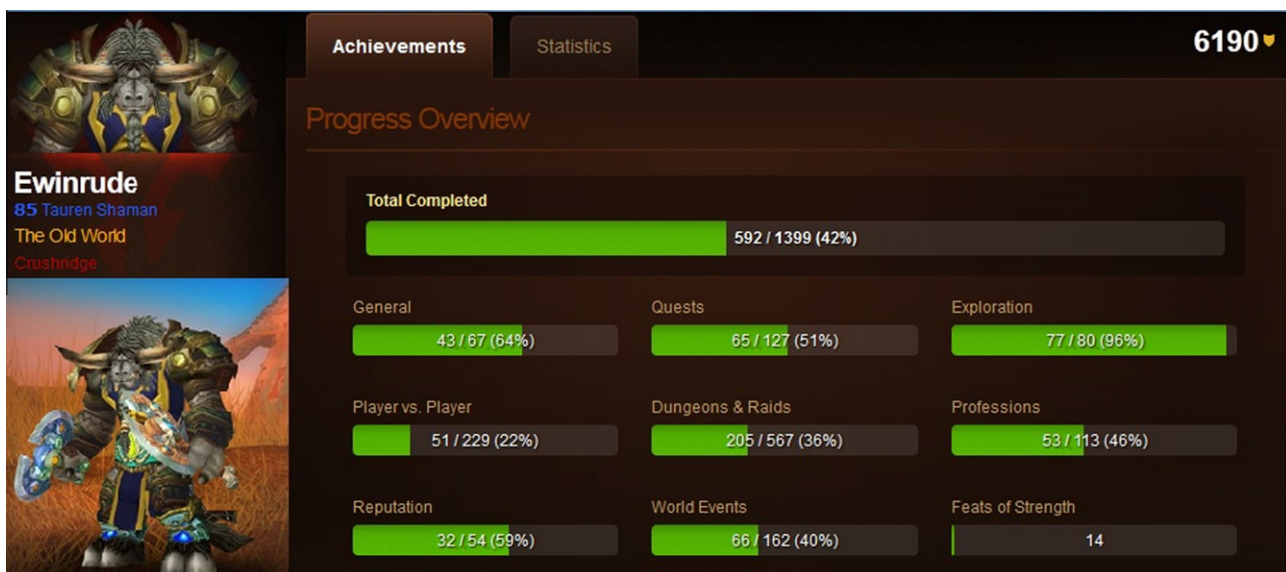


Fig. 1. Example of screenshot from the *Armory of World of Warcraft*: <http://eu.battle.net/wow/en/>.

depended solely on the progression of the Dungeons and Raids achievements. Progression indexes were collected in persistent players, i.e. players whose avatar was still active at the follow-up measure. Avatars were considered as inactive at the follow-up measure if they no longer appeared in the *Armory* (which means that these avatars have been given up or deleted by the players), or if the date of their last achievement reached was identical at the first and the second data collection. The indexes are computed according to the following formula:

$$\text{Progression for a specific type of achievement} = (\text{AchT2} - \text{AchT1}) / \Delta T2T1$$

where AchT2 is the number of achievements of a specific type at the follow-up (T2); AchT1 the number of achievements of a specific type at the first evaluation (T1); and $\Delta T2T1$ is the number of days from the inclusion of the study (date at which participants completed the online survey) to the end of the study (date at which the follow-up measure was collected).

3. Results

For clarity, Section 3 is subdivided into two parts: (1) analyses regarding the first evaluation (T1), and (2) analyses regarding the 2 months of prospective data (T2).

3.1. Relationships observed at first evaluation

Two-tailed Pearson correlations were used to evaluate relations between self-reported motives to play online and other variables of the study. The Pearson point-biserial correlation was used to evaluate relationships with dichotomous variables. To account for the elevated number of correlations computed ($n = 180$), we decided to apply a Bonferroni correction. Correlations were thus considered significant at the level of $P < .00028$. Pairwise treatment of missing data was used. The correlations are reported in Table 1.

The main findings from correlation analyses can be summarised at three distinct levels: (1) demographic variables (age and gender); (2) self-reported players' variables (hours of play per week, time since playing WoW, reported play in cybercafés or at work, and problematic use); and (3) in-game variables (in-game behaviours, affiliation with a guild and types of server chosen). Concerning demographics, younger players appeared to be more motivated by advancement in the game than older players were. In addition, both male gender and young age were related to a greater proneness to look for competition in the game, whereas both female and older players showed a greater interest in discovery and exploration of WoW. Regarding self-reported involvement in the game, first, the number of hours devoted to WoW daily appeared to be strongly related to an advancement motive, but also to mechanics, competition, relationship, customisation and escapism. Second, the number of years since the participants played was related only to the mechanics motive. Third, participants playing in cybercafés were more interested in both competition and advancement, whereas no motives were related to the tendency to play at work. Fourth, several associations took place between self-reported motivation to play online and negative outcomes resulting from gaming. In particular, an addictive usage pattern (measured by the IAT) was primarily related to the advancement and the escapism motives, although significant relationships of smaller amplitude were found with other motivations, namely, mechanics, competition, role-play and customisation.

If self-reported motivations to play online are valid constructs, they should be related to actual in-game behaviours. Relationships taking place between self-reported motives and data related to avatar actions are thus of much interest. Specific meaningful associations were identified between self-reported motives and in-game actual achievements. The total progression score (which accumulates the various types of achievements) was primarily associated with advancement and mechanics motives, but also related to the relationship and discovery motives. Quests and explorations achievements were specifically related to the discovery motive. PvP achievements were primarily related to the

Table 1
Correlations between the various motives to play online, demographics, self-reported WoW use and actual WoW use ($N = 690$).

Variables	Advancement	Mechanics	Competition	Socialising	Relationship	Teamwork	Discovery	Role-play	Customisation	Escapism
<i>Demographics</i>										
Age	-.15*	-.05	-.27*	.01	-.1	-.09	.14*	-.04	-.11	-.05
Gender (women = 1) ^a	-.09	-.08	-.2*	.1	.08	-.05	.15*	.04	.11	.09
<i>Players' data</i>										
Hours/week	.37*	.25*	.25*	-.09	.18*	.03	.03	.11	.18*	.26*
Years of playing	.08	.16*	.12	-.03	.1	-.07	.05	.03	.1	.03
Playing in cybercafés ^a	.18*	.07	.16*	-.03	.07	.05	-.04	.09	.03	.08
Playing when at work ^a	.09	.08	.07	.04	.06	.0	.07	.06	.05	.05
Excessive use (IAT)	.47*	.26*	.3*	-.12	.05	-.11	-.03	.2*	.24*	.48*
<i>Avatars' data</i>										
Affiliated with a guild ^a	.02	.0	-.09	.17*	.15*	.17*	.02	-.02	-.05	-.08
Total progression	.26*	.24*	.09	-.02	.15*	.07	.16*	-.06	.01	.08
Miscellaneous	.19*	.16*	-.02	.01	.11	.00	.24*	-.02	.02	.06
Quests	.07	.13	-.06	.01	.05	-.05	.28*	-.01	.02	.03
Explorations	.08	.07	-.11	.09	.07	-.03	.34*	.0	-.01	.01
Players versus players	.3*	.21*	.39*	-.11	.11	.07	-.07	-.08	.01	.11
Dungeons and raids	.33*	.31*	.14	-.07	.18*	.15*	-.02	-.11	.0	.1
<i>Type of server chosen</i>										
Server PvP ^a	.13	.09	.23*	-.04	.04	.04	-.11	-.1	-.02	.0
Server PvP-RP ^a	.02	-.03	.12	-.01	-.01	-.03	.01	.08	.08	.05
Server PvE ^a	-.12	-.02	-.22*	-.02	-.06	.0	.04	-.05	-.1	-.04
Server RP ^a	-.05	-.08	-.13	.1	.05	-.03	.09	.14*	.1	.01

* Correlations significant at $P < .00028$.

^a For these variables, we applied Pearson's biserial correlations.

competition motive, although significant associations also took place with both advancement and mechanics motives. Dungeon and raids achievements were associated with a variety of motives, including advancement, mechanics, relationship and teamwork. The miscellaneous achievements score was related to the advancement, mechanics and discovery motives. Finally, role-play, customisation and escapism motives were unrelated to specific in-game achievements.

Correlation analyses also emphasised that self-reported motives logically relied on the type of servers chosen by the players. Participants playing in PvP servers were motivated by competition, whereas the opposite relation was found for people playing in PvE servers. Participants who subscribed to the RP servers were indeed primarily driven by role-playing-related motives. No significant relations were found between motives to play online and choosing a server that mixed features of role-play and competition/fighting with other players (RP–PvP servers). Participants who were highly motivated by socialising, team work and seeking relationships with other people were more often affiliated with a guild.

3.2. Longitudinal data regarding progression in the game

Among the 690 participants surveyed at the first evaluation, 516 (74.8% of the sample) still played their avatar at the time of the second data collection. Multiple regression analyses were performed to determine which types of self-reported motives further predict actual progression in the game. Regression analysis allows highlighting of the relative importance of each predictor and determines the specific effect of each because it takes into account the relations between the various predictors. Three regressions were computed with the progression indexes as dependent variables (global index, PvP index, PvE index). Fifteen independent predictors were entered in the models: 10 self-reported motives (MPOGQ subscales); gender, age, guild affiliation and addiction symptoms (IAT score); and the number of hours played weekly. Inspection of residuals and multicollinearity effects showed that the conditions of application for regression analyses were respected.

The multiple regressions computed emphasised the following results. Progression in the game, at a global level, was predicted by the discovery and teamwork motivations, affiliation to a guild and weekly hours of play. Progression regarding the competitive aspects of the game (PvP index) was predicted only by the motiva-

tion to compete and fight other players and by a younger age. Finally, progression related to cooperative achievements (PvE index) was positively predicted by the motivation of teamwork, the motivation of discovery, affiliation with a guild and weekly hours of play, and it was negatively predicted by the customisation motive. Problematic WoW use (IAT score) was not significantly related to the indexes computed. Regression analyses are reported in Table 2.

4. Discussion

The current study was an in-depth investigation of the relationships between self-reported motivations to play and real in-game behaviours in persons involved in WoW, the overall most popular MMORPG at the time of the study. Specific associations were found between players' motives and in-game preferences or actions (e.g. type of achievements targeted, type of server chosen, affiliation with a guild). Moreover, longitudinal analyses based on avatar monitoring revealed that certain motives are predictors of optimised progression in the game. In addition, although specific associations exist between problematic use and certain motives (e.g. advancement, escapism), longitudinal analyses showed that high involvement in the game is not necessarily associated with a negative impact upon daily living.

First, the comparison of cross-sectional and longitudinal analyses brings about insightful observations. It thus appears that although advancement and mechanics motives are associated with higher achievement scores in the game in the cross-sectional analysis (data collected in the initial survey), optimised progression in the game (data collected through avatar monitoring) is better predicted by other motives, such as teamwork or discovery, as well as by being affiliated to a guild. In other words, players motivated by advancement and mechanics eventually display elevated ranking in the game (reflected by elevated achievement scores in the *Armory*), but our longitudinal data suggest that this will for them require more time and effort if they are not motivated by both discovery and cooperation with other players (which generally involves joining a network of players in a guild). This explanation is valuable when considering PvE play, which refers to playing in order to progress in the game (e.g. succeeding in specific quests, solving problems or beating monsters controlled by an artificial intelligence and generated by the designers of the game). However, the picture seems somewhat different for people who are more

Table 2
Predictors of progression in the game ($N = 516$).

Predictors	Global index				PvP index				PvE index			
	β	SE	t	Sig.	β	SE	t	Sig.	β	SE	t	Sig.
Age	-.07	.05	-1.52		-.1	.05	-2.12	*	-.06	.05	-1.23	
Gender	.04	.05	.77		.02	.05	.34		.04	.05	.89	
Addiction symptoms (IAT)	.05	.06	.82		.06	.06	1.03		.07	.06	1.28	
Guild affiliation	.11	.05	2.39	*	.09	.05	1.9		.12	.04	2.6	**
Hours played weekly	.12	.05	2.33	*	.08	.05	1.56		.13	.05	2.63	**
MPOGQ-advancement	.06	.06	1.1		-.02	.06	-.4		.09	.05	1.39	
MPOGQ-mechanics	-.04	.05	-.81		-.07	.05	-1.44		-.03	.05	-.65	
MPOGQ-competition	.01	.05	.25		.16	.05	3.02	**	-.01	.05	-.1	
MPOGQ-socialising	.02	.05	-.28		-.02	.05	-.44		-.02	.05	-.34	
MPOGQ-relationship	-.05	.05	-1.01		.03	.05	.52		-.06	.05	-1.09	
MPOGQ-teamwork	.11	.05	2.31	*	.02	.05	.49		.16	.05	3.31	***
MPOGQ-discovery	.17	.05	3.37	***	.08	.05	1.51		.16	.05	3.06	**
MPOGQ-role-play	-.01	.05	-.19		-.01	.05	-.11		-.01	.05	-.13	
MPOGQ-customisation	-.07	.05	-1.25		.02	.05	.43		-.12	.05	-2.32	*
MPOGQ-escapism	.03	.05	.54		-.05	.05	-.92		.04	.05	.83	

Sig.: Significance.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

interested in PvP play, which involves fighting with other players (e.g. in virtual arena tournaments or on battlegrounds), rather than strictly progressing in the game. Indeed, the progression index related to PvP ranking is predicted neither by discovery nor team-work motives, nor by the affiliation to a guild, but rather by the degree of self-reported motivation toward competition in the game (e.g. playing to beat other players and/or to annoy them). Similar results have been found by Chen, Sun, and Hsieh (2008), who highlighted that guilds that regroup competition-oriented players are often created for the purpose of short-term objectives and are rapidly dissolved or deserted by their members. The negative relationship found between game progression and the customisation motive may be because players who give importance to the aesthetic aspects of the game are prototypical immersion-motivated players who are not at all interested in achievement rankings, i.e. persons who want to be emerged in a fictional virtual world and to play the role of an imaginative character (the customisation motive displays a high correlation with the role-play motive and low correlations with motives such as advancement or competition; see online Supplementary material). In support of this hypothesis, we found that both customisation and role-play motives are unrelated to the achievement scores measured.

Although establishing associations between motives to play and problematic involvement in WoW was not central to the study, some of our findings that may be related to this topic warrant further discussion. First, the study results are consistent with previous studies that established the achievement and escapism motives are central in problematic MMORPG use (Achab et al., 2011; Billieux et al., 2011; Yee, 2006b; Zanetta Dauriat et al., 2011). It could thus be postulated that the dysfunctional use of MMORPGs most often results in either an uncontrolled drive to look for achievement in the game, or a maladaptive strategy used to cope with negative emotions (e.g. depression, anxiety or boredom). The latter hypothesis is also supported by the fact that the escapism motive is unrelated to actual in-game behaviours, as well as by the progression indexes in the longitudinal analysis that imply that escapers play to be immersed in a virtual reality more than to reach specific objectives in the game. Another meaningful result to mention is that a dysfunctional use pattern (IAT score) failed to predict any index of progression in the game. This adds to the position previously claimed by Charlton and Danforth (2007), stipulating that high engagement has to be distinguished from dysfunctional or excessive use. Such a view should ultimately help reduce the tendency to systematically stigmatise MMORPG players in both clinical psychology research and the mass media.

The current study is, to the best of our knowledge, the first attempt to test Yee's model (2006b) about motives to play online by contrasting different models through the use of confirmatory factor analysis techniques (see online Supplementary material for the various models computed). Indeed, previous studies (Billieux et al., 2011; Yee, 2006a, 2006b) conducted exploratory factor analyses only to disentangle the heterogeneity of self-reported motivations to play online, which raised concerns about the generalisability of their findings. Our study thus also shows that the French version of the MPOGQ presents good psychometrical properties, as reflected by a meaningful factorial structure, high internal consistencies (Cronbach's α range from .65 to .85 for the various subscales) and evidence of external and internal validity (associations with actual in-game behaviours, associations with symptoms of disordered online gaming). Taken together, these findings support that the MPOGQ is a valid instrument to investigate motivations to play online.

A limitation to the study is that we considered players to have a unique main avatar, although we cannot exclude the possibility that some participants had more than one character that they considered as main characters. For example, someone can have a char-

acter devoted to PvP and another character devoted to PvE. Nevertheless, in defence of our approach, only three participants (.44% of the sample) spontaneously mentioned more than one main character, whereas the rest of the sample identified a unique main character.

Further studies should be elaborated to determine whether not only online-game related motives, but also the basic motives rooted in people's personality (e.g. achievement, social affiliation, power; see e.g. Carver & Scheier 2008) predict actual in-game behaviours. Indeed, the possibilities offered by permanent virtual worlds such as WoW are huge and can probably satisfy a wide range of people's basic drives. For example, the affiliation to a guild can be related to heterogeneous needs such as achievement (e.g. a player who seeks to be part of a recognised or known guild), social affiliation (e.g. a player who wants to communicate and have exchanges with persons whom he or she is likely to eventually meet in real life) or power (e.g. a player who wants to become a guild master to control or have an influence on other persons).

To conclude, we want to emphasise that this study fills an important gap in the literature about people's motivations to play online games. Indeed, although studies on this topic have flourished during recent years (especially in the context of problematic MMORPG involvement), our study is the first large-scale attempt to relate self-reported motivations to behaviours actually realised by players in virtual worlds.

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Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.chb.2012.07.021>.

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